While LÖWSCHIN admits that at present he is describing analogies, still he believes that these are too numerous and too striking to be merely accidental.—CHARLES J. CHAMBERLAIN.

Recent work among gymnosperms.—SAXTON[39] has investigated one of the two species of *Actinostrobus*, an endemic Australian genus, and therefore well worth investigation. An outline of the results is as follows. The microsporophyll bears three sporangia and about three months elapse between pollination and fertilization. The archegonia are numerous and deep-seated, "a group of 25–30 being found abutting on the lower end of each pollen tube, which reaches about halfway down the prothallus," the older cells of which are generally 2-nucleate or 4-nucleate. In proembryo-formation, walls are formed when the two free nuclei divide, so that there is a 4-celled proembryo. The completed proembryo, consisting of few cells, fills the egg. Each cell of the proembryo (with perhaps the exception of the two "apical cells") gives rise to a suspensor and an embryo-initial, being as independent in embryo-formation as are the pro-embryonal cells of *Ephedra*. The chromosome numbers are 8 and 16.

TAKEDA[40] has studied in detail the anatomy of the leaf of *Welwitschia* and concludes that the evidence is all in favor of the Gnetales being gymnosperms, as opposed to the view of LIGNIER and TISON. Even the tracheae, the most striking angiospermous anatomical feature, are in a transition stage, showing incomplete perforations.

TAKEDA[41] has developed a theory of the so-called "transfusion tissue" of gymnosperms. He finds that the "orthodox" transfusion tissue always arises laterally, and is quite independent of centripetal xylem. Therefore, it is not a vestige of the centripetal xylem and is not to be regarded as of phylogenetic significance, its function being "water-storing."—J. M. C.

Gemmae in Radula.—The development of gemmae in two species of *Radula* has been studied by Miss WILLISTON.[42] In *R. flaccida*, a native of tropical America, the gemmae occur on the dorsal margin of the leaves, and formation begins by the enlargement of a single cell around which a transparent gelatinous substance is secreted. A periclinal wall divides the gemma initial into a stalk cell which undergoes no further division, and an outer or mother cell which is divided by an anticlinal wall. The next division gives a quadrant, the two outer cells of which immediately function as apical cells with two cutting faces. The two inner cells of the quadrant do not produce apical cells.

---

[39] SAXTON, W. T., Contributions to the life history of *Actinostrobus pyramidalis* Miq. Ann. Botany **27**:321–345. *pls. 25–28*. 1913.

[40] TAKEDA, H., Some points in the anatomy of the leaf of *Welwitschia mirabilis*. Ann. Botany **27**:347–357. *pl. 29*. 1913.

[41] TAKEDA, H., A theory of "transfusion tissue." Ann. Botany **27**:359–363. 1913.

[42] WILLISTON, RUTH, Bull. Torr. Bot. Club **39**:329–339. *figs. 37*. 1912.

The gemmae at maturity measure 0.5 mm. in diameter. The adult leaf measures 0.8 mm. in diameter. In *R. protensa*, a native of New Guinea and adjacent regions, the initial becomes covered with a greater quantity of gelatinous material than in *R. flaccida*. As the gemma increases in size it finally bursts through the gelatinous covering, which then clings to the base like a collar.

The gemmae of *Radula* are arranged in two groups according to complexity. In the first group the gemmae occur on margins of leaves, are irregular in outline when mature, and may be more than one cell thick; in the second they occur on the margin and surface of leaves, are regular in development and symmetrical in form, and are only one cell thick. *R. flaccida* and *R. protensa* belong to the second class.—W. J. G. LAND.

Cytology of Hymenomycetes.—LEVINE,[43] working in Harper's laboratory, has investigated the carpophores of 24 species of *Boletus* and of several species of *Polyporus*, has had in cultures the mycelia of various Hymenomycetes, and has secured some spore germination (none of the spores of *Boletus* germinated), so that his observations of the nuclear phenomena are somewhat extensive. The germinating spores of *Pholiota praecox* produce multinucleate germ tubes; in cultures 48 hours old the cells of the mycelium are multinucleate; but in cultures 3 days old, both uninucleate and binucleate cells are found. The mycelial cells of many species are binucleate, with clamp connections, etc. In the mature stipe of *Boletus granulatus* all the cells are multinucleate; while those of the ring, of the flesh and trama, and of the subhymenium are binucleate. At the end of the second division of the fusion nucleus in the basidium, the centrosomes become attached to the walls of the basidium and the 4 daughter nuclei remain connected with them by fibrillar strands. The centrosomes determine the points of origin of the 4 sterigmata and are carried up with the growth of the sterigmata and into the spores, pulling the nuclei into the spores. All the spores studied were uninucleate at first. The conclusion is that an alternation of generations "comparable to that in the Uredineae" is also present in these forms. "The sporophyte begins at some indefinite point in the mycelium and extends through the development of the carpophore."—J. M. C.

Aluminium salts.—FLURI[44] has claimed that aluminium salts render certain plant cells incapable of being plasmolyzed by ordinary plasmolytic agents by rendering the protoplasm highly permeable to these reagents. SZÜCS[45] finds that the protoplasm is rendered less permeable to many agents by aluminium salts,

---

[43] LEVINE, MICHAEL, Studies in the cytology of the Hymenomycetes, especially the Boleti. Bull. Torr. Bot. Club **40**:137–181. *pls. 4–8.* 1913.

[44] BOT. GAZ. **47**:252. 1909.

[45] SZÜCS, JOSEPH, Über einige characterische Wirkung des Aluminiumions auf das Protoplasma. Jahrb. Wiss. Bot. **52**:269–332. 1913.